

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-315/84-13(DRS); 50-316/84-15(DRS)

Docket No. 50-315; 50-316

License No. DPR-58; DPR-74

Licensee: American Electric Power Service Corporation
Indiana & Michigan Power Company
1 Riverside Plaza
Columbus, Ohio 43216

Facility Name: D. C. Cook Nuclear Plant, Units 1 and 2

Inspection At: D. C. Cook Site, Bridgman, Michigan

Inspection Conducted: July 9 through September 19, 1984

Inspectors: *P.R. Wohld for* *October 12, 1984*
P. L. Eng Date

P.R. Wohld for *October 12, 1984*
P. R. Wohld Date

Roger D. Walker for *October 12, 1984*
W. G. Guldemon Date

Approved By: *Roger D. Walker for* *October 12, 1984*
L. A. Reyes, Acting Chief Date
Operational Programs Section

Inspection Summary

Inspection on July 9 through September 19, 1984 (Report No. 50-315/84-13(DRS); 50-316/84-15(DRS))

Areas Inspected: Routine, announced inspection of licensee actions on previous inspection findings; inservice test program for pumps and valves; turbine driven auxiliary feedwater pump testing; surveillance test criteria and operability reviews; selection of limiting valve stroke times; visual observation of valve stroking; corrective action for valves; pressure isolation valve testing; containment recirculation sump isolation valve testing; and pump test program specifics. The inspection involved a total of 144 inspector-hours onsite and 98 inspector-hours offsite by three NRC inspectors, including 20 inspector-hours onsite during offshifts.

Results: Of the ten areas inspected, no items of noncompliance or deviations were found in seven areas; three items of noncompliance were identified in the remaining three areas (failure to meet a Technical Specification requirement - Paragraph 4b; uncalibrated equipment used for surveillance testing - Paragraph 4c; inadequate implementation of valve surveillance test requirements, multiple examples - Paragraphs 6, 8a and 8b).

DETAILS

1. Persons Contacted

D. C. Cook Plant

- *#W. G. Smith, Jr., Plant Manager
- #J. F. Stiet el, QC Superintendent
- #R. L. Dudding, Maintenance Superintendent
- #D. M. Ruth, ISI
- #C. A. Freer, ISI
- #E. A. Smarrella, Staff Assistant
- #M. A. Lester, Performance
- *#K. S. Chapman, Performance
- #W. V. White, Operations
- #K. R. Baker, Operations Superintendent
- *#A. A. Blind, Technical Engineering Superintendent
- *#E. L. Townley, Assistant Plant Manager
- *B. A. Svensson, Plant Manager, Operations
- *R. L. Otte, ISI Supervisor
- *G. H. Caple, QC Engineer
- *T. R. Stevens, Operations
- *C. E. Murphy, Operations Production Supervisor
- #D. F. Krause, Operations

American Electric Power Service Corporation

- #M. Alexich, Vice President Nuclear Engineering
- #S. Grimes, Mechanical Engineering
- #M. Marrocco, Mechanical Engineering
- #J. Mankowski, Assistant Vice President Engineering
- #S. Steinhart, Assistant Division Head
- *#J. Kobyra, Cook Project Engineer
- #J. Feinstein, Section Manager, Nuclear Safety & Licensing
- *#S. Sharma, Project Mechanical Engineer
- *R. F. Kroeger, QA Manager
- *T. P. Peilman, QA Supervisor

*Denotes those attending the exit interview held on August 10, 1984.

#Denotes those attending the exit interview held on September 19, 1984.

Ad [redacted] plant technical and administrative personnel were contacted by [redacted] during the course of the inspection.

Inspection Findings

[redacted] Open Item (315/84-02-03; 316/84-02-03): Procedural inconsistencies regarding valve stroke time measurements in the Component Cooling Water System surveillance tests for both Units 1 and 2. The inspector reviewed the revised procedures and found that the inconsistencies had been acceptably resolved.

- b. (Open) Unresolved Item (315/84-12-03; 316/84-14-03): Timeliness of pump operability determinations and acceptability of vibration limits. This subject was discussed at length and expanded in scope. The licensee made commitments which the inspector found satisfactory to resolve this issue. Details are found in Paragraph 5. Closure of this item is pending implementation of licensee commitments and subsequent inspector review.

3. Inservice Testing of Pumps and Valves

The inspector inspected implementation of the licensee's pump and valve inservice test program for compliance with Appendix B of 10 CFR 50, 10 CFR 50.55a(g), and Subsections IWP and IWV of Section XI of the ASME Boiler and Pressure Vessel Code (1974 Edition through Summer 1975 Addenda). The inspection included reviewing administrative and surveillance procedures for inservice testing, reviewing test results and documentation, and witnessing performance testing of the Unit 2, turbine driven auxiliary feedwater pump. Because the licensee had not received approval from the Commission for Code testing exception requests, per 10 CFR 50.55a(g), the inspector evaluated implementation of the program with exceptions as submitted for approval under the first ten year inspection interval.

The inspector found that the licensee has a program in place and is conducting pump and valve tests according to appropriate schedules, using approved test procedures. Problems were identified in both the pump and valve testing areas. The pump program, in spite of problems identified, appeared generally well defined with the appropriate evaluation of collected data being done by licensee staff personnel knowledgeable in the Code. Evaluations were done for operability determinations after each test and data was plotted to determine trends that would show degradation developing. The valve program, however, was found to be inadequate in a number of areas that significantly affect its viability in detecting and correcting valve problems as intended by the Code.

Specific findings are discussed in the paragraphs that follow.

4. Inservice Testing of the Turbine-Driven Auxiliary Feedwater Pump

The inspector reviewed test procedure 2-OHP 4030.STP.017, Revision 4, "Auxiliary Feedwater System Test", and witnessed testing of the Turbine Driven Auxiliary Feedwater Pump (TDAFP). The following was identified:

- a. Step 8.3.25 of the test procedure required the TDAFP governor control valve to be set at 50%. This practice placed the TDAFP in a condition which did not allow the TDAFP to produce the flow in the time required upon receiving an Engineered Safety Features actuation signal as required by Technical Specifications. This item was discussed in an Enforcement Conference held in Region III on September 7, 1984. Further details are covered in Inspection Report (315/84-18 (DRP) 316/84-20 (DRP)).

- b. Steps 8.3.13 and 8.3.14-2 of the procedure allow the TDAFP to be declared operable with an observed pump discharge pressure as much as 47 psi lower than the Technical Specification 4.7.1.2 limit of 1285 psig. The licensee stated that lower discharge pressures are related to higher temperatures of the pumped fluid. The inspector noted that the plant requirements for heat removal were not taken into account in the licensee's justification of lowered pump discharge pressures and that discharge pressures lower than the Technical Specification limit had been accepted in previous pump tests. The approval of test procedures and acceptance of test results which do not meet the requirements of Technical Specification 4.7.1.2 is considered to be an item of noncompliance (315/84-13-01(DRS); 316/84-15-01(DRS)).
- c. Criterion XII, Control of Measuring and Test Equipment, in Appendix B of 10 CFR 50 requires calibrated equipment to be used in "activities affecting quality." Contrary to this, the stopwatch used during the performance of the test did not have a serial number identifier and did not have a calibration or accuracy check requirement. In addition, the hand held tachometer used to determine pump speed did not have a calibration or accuracy check associated with it. Failure to establish controls for measuring and test equipment used to determine equipment operability is considered to be an item of noncompliance against Criterion XII (315/84-13-02(DRS); 316/84-15-02(DRS)). During the course of the inspection, the licensee initiated measures to incorporate calibration requirements for all test equipment used for determining equipment operability into existing calibration procedures via Plant Manager Instruction PMI-6030. This appears to be acceptable corrective action taken by the licensee. Consequently, no written response to this item of noncompliance is required and the inspector considers this item closed.
- d. Discussions with the licensee indicated that currently there is no test procedure which adequately demonstrates the capability of the TDAFP to respond at a given flow within the response time stated in Technical Specification 4.3.2.1.3, Table 3.3-5, upon receipt of an ESF actuation signal. The licensee is reviewing the surveillance procedures and will revise the procedure as necessary to provide assurance that the TDAFP can perform its safety function. Final resolution of this concern is considered an unresolved item (315/84-13-03(DRS); 316/84-15-03(DRS)).
- e. During discussions with the licensee, it was learned that the governor control for the TDAFP is operated by a non-safety related instrument air supply. The licensee has not implemented periodic testing or maintenance to assure that the TDAFP will perform acceptably upon loss of air. Pending further investigation, this is considered to be an open item (315/84-13-04(DRS); 316/84-15-04(DRS)).
- f. The inspector questioned the adequacy of testing to assure that resetting the turbine governor for automatic control would not cause or increase the possibility of causing an auxiliary feedwater pump

low suction pressure trip to any of the three pumps. The licensee indicated that a five second trip delay prevents the trip from occurring inadvertently and that testing has also been done. The inspector considers this an open item (315/84-13-05(DRS); 316/84-15-05(DRS)) pending review of the test results.

No other noncompliances or deviations were identified.

5. Pump Surveillance Test Criteria and Operability Reviews

The licensee currently defers pump operability determinations under Section XI testing to a review group separate from the plant operating staff performing the testing. Questions were raised in this area in Inspection Report (315/84-11(DPRP); 316/84-12(DPRP)) and by unresolved item (315/84-12-03(DPRP); 316/84-14-03(DPRP)).

The licensee is resolving this item by entering operability limits in the test data sheets for all Section XI pump tests. Operability will be determined in the same time frame as in other Technical Specification operability determinations. Operability limits will be according to Code requirements unless relief requests are submitted to the NRC and approved. The 96 hour evaluation time will remain acceptable only for additional operability reviews to backup initial determinations, for trending, and for initiating action for pumps in the "alert" range.

Prior to implementing the above in all of the test procedures, the licensee agreed that by October 10, 1984, all pump operability limits will be in a Technical Data book available in the control room against which surveillance test data will be evaluated and pump operability determined before a test is accepted by the on-shift supervisors. The inspector stated that it would be acceptable to retain the source of test criteria in the Technical Data book and to transfer the criteria to the data sheets at the time of testing. The licensee stated that it would take approximately three to four months to change the test procedures and data sheets.

The inspector considers the licensee's proposal fully acceptable. The related unresolved item (315/84-12-03(DPRP); 316/84-14-03(DPRP)) will remain open pending inspection of implementation of the commitments made and of associated changes to program instructions including Plant Managers Instructions, PMI-5070, "Inservice Inspection", and Surveillance Test Procedure No. 12 THP 4030 STP.222, RI, "ISI Pump Test Program."

No items of noncompliance or deviations were identified.

6. Limiting Value of Valve Stroke Time

The inspector reviewed the limiting value of valve stroke times set by the licensee for power operated valves tested in the inservice testing program. The inspector noted that times chosen were, in fact, system response times.

Subsection IWV-2130 of Section XI defines exercising as "the demonstration based on direct or indirect visual or other positive indication that moving parts of a valve function satisfactorily;" IWV-3410c states that the "limiting value of full stroke time" is one of the criteria for test acceptance. Consequently, stroke time limits for a given valve must be chosen such that achieving this value would indicate the satisfactory physical condition of the valve. System response times used by the licensee are not adequate for this purpose.

Test records show that both motor and air-operated valves with observed stroke times of less than ten seconds and two seconds, respectively, have been assigned maximum stroke times of 120 seconds. These stroke times are well beyond those representative of satisfactory valve condition and, hence, fail to meet the Code requirements noted above. This failure also degrades the basic purpose for the inservice testing of valves, stated in Subsection IWV-1100, "to verify valve operational readiness on a continuing basis." Failure to meet the requirements or intent of Subsections IWV-2130 and IWV-1100 of the code is considered to be an example of an item of noncompliance (315/84-13-06(DRS); 316/84-15-06(DRS)), Notice of Violation, Item 3.a.

No other items of noncompliance or deviations were identified.

7. Visual Observation of Valve Stroke

Subsection IWV-3300 states that "All valves with remote position indicators, which during plant operation are inaccessible for direct observation, shall be visually observed...to confirm that remote valve indications accurately reflect valve operation." In addition, ASME Code interpretation XI-1-79-18 states "It is the intent of Section XI...to require that all valves, accessible and inaccessible, that have remote valve indicators be visually checked...to verify that remote valve indications accurately reflect valve operation." The licensee stated that remote valve indications are checked for inaccessible valves only, and that they were unaware of the Code interpretation. The inspector also noted that stroke timing of valves is generally performed by observing the light indicators in the control room which may not indicate actual valve stem movement. The licensee agreed to review the valve stroke test procedures and revise them as necessary.

The inspector also reviewed Surveillance Test Procedure 1-OHP 4030.STP.034, "Local Valve Position Verification Test," Revision 4, and questioned its suitability for the purpose intended. It does not require timing the valve stroke, measuring stroke distance, verifying proper limit switch setting, relating actual stroke time to timing by position lights, etc. The licensee agreed to re-evaluate the adequacy of the procedure.

The inclusion of the proper valve stroke observations and revision of the stroke observation procedure are considered to be an unresolved item (315/84-13-07(DRS); 316/84-15-07(DRS)) pending further evaluation and procedure revision by the licensee and subsequent review by the inspector.

No items of noncompliance or deviations were identified.

8. Corrective Action Activities Related to Valve Surveillance Testing

The inspector reviewed the licensee's corrective action program for valves for compliance with Section IWV of the Code and Criterion XVI, Corrective Action, in Appendix B of 10 CFR 50. Several problems were identified and questions raised as follows:

- a. There was no program level documentation for valve problems identified. Hence, plant experience was not available to be reviewed by the licensee in terms of failure rate, repetitive failures, failure trends, etc. Therefore, the requirements under Criterion XVI for the identification of "conditions" or "significant conditions" adverse to quality was not addressed, other than identifying individual valve problems. The lack of documentation also negated or minimized the licensee's ability within the program to identify causes, take corrective action, or document and report to management as required by the same criterion for significant conditions adverse to quality. Failure to meet the requirements of Criterion XVI is considered to be an example of an item of noncompliance (315/84-13-06(DRS), 316/84-15-06(DRS)), Notice of Violation, Item 3.b.

There are approximately thirteen hundred valves in both units combined which come under the surveillance program. The licensee is currently developing a computer program to accumulate test information for these valves to help facilitate the needed analyses and evaluations.

- b. Corrective action required by IWV-3410(c)(3) was not being performed properly in three different circumstances.
- (1) If a valve increased in stroke time to a point where monthly testing or corrective action was required, only one additional test would be requested without further attention to additional tests or corrective action as long as the additional test did not result in an additional 25% or 50% jump in response time. This allows valve degradation to continue without increased surveillance or corrective action required by the Code.
 - (2) Valves which can only be operated infrequently because of plant operating requirements were allowed to increase in stroke time without meeting the monthly test requirements or corrective action required by IWV-3410(c). While the licensee has requested relief to extend the surveillance period for these valves, the necessary corrective action for increased stroke times has not been addressed (either by corrective action on the equipment or by requesting relief and proposing alternatives).
 - (3) Valves leak tested according to 10 CFR 50, Appendix J, have not been individually analyzed for leakage increases nor has corrective action been implemented according to IWV-3420(g) of the Code. The inspector stated that this corrective action is required unless exception is requested and approved.

The above three examples of failure to meet corrective action requirements of the Code are considered to be an example of an item of noncompliance (315/84-13-06(DRS); 316/84-15-06(DRS)), Notice of Violation, Item 2.c.

c. Additional items noted were as follows:

- (1) Attachment 2 to Plant Manager's Instruction, PMI-570, "Inservice Inspection", indicates that the first stroke of a valve "shall" be the one recorded for surveillance data. However, the inspector noted a condition report describing a valve stroke failure, manual exercising, then recording a stroke time. A subsequent maintenance investigation reported "no problem." Hence, the failure and subsequent corrective action in this case escaped documentation. The licensee understands the problem with this and indicated changes would be made to assure that appropriate data is entered on surveillance test results to facilitate meaningful reviews both of problems identified and corrective action taken.

This is considered an open item (315/84-13-08(DRS); 316/84-15-08(DRS)) pending resolution by the licensee and subsequent review by the inspector.

- (2) It was noted on a test data sheet for retest after maintenance that valve stroke time limits were not specified to be met for acceptance of the valve at the time of testing. This is a specific item related to the discussion on test criteria in Paragraph 5 and should be corrected by the licensee's activity discussed therein.

This is considered an open item (315/84-13-09(DRS), 316/84-15-09(DRS)) pending revision of the data sheet and subsequent review by the inspector.

No other items of noncompliance or deviations were identified.

9. High to Low Pressure Interface Valve Testing

Closure testing is required for valves that protect low pressure piping and vessels from reactor coolant system pressure. This testing is specified in Unit 1 and 2 Technical Specifications and Unit 2 license condition (3)(c). The inspector determined that the licensee has been considering compliance with license condition (3)(c) voluntary (in test procedure 12 THP 4030 STP.226, Revision 5) and has not included test requirements for closure testing of these valves in its currently implemented valve test program list. The inspector informed the licensee that compliance with license conditions is mandatory and that testing must be implemented as required unless the license condition is removed.

The inspector also determined that the rotameters, IFI-305 and IFI-306, used in leak testing some of the pressure isolation valves are a type that can give a false, zero leakage reading if not used with caution.

The rotameter used is a magnetically coupled, vertically mounted device which uses a magnet floating in the fluid stream. The magnet picks up a metal ring flow indicator which is free to move around a nonmagnetic tube housing the magnet. If there is a rapid acceleration of water through the rotameter, the metal ring is left on the bottom of the rotameter, reading zero flow.

The licensee agreed to review its test program in this area to assure compliance with requirements and to either assure that the test flow meter was used in a manner that did not give false readings or to review previous test data and take the necessary action to assure that a high leak rate was not overlooked. This is an unresolved item (315/84-13-10(DRS); 316/84-15-10(DRS)) pending further evaluation by the licensee, possible retesting of the valves, and subsequent review by the inspector.

No items of noncompliance or deviations were identified.

10. Filling and Venting of the Containment Recirculation Sump Suction Lines Downstream of the Sump Isolation Valves

The inspector reviewed testing of the containment recirculation sump suction line isolation valves to assure that the test technique would not allow air into the suction lines. This resulted in the determination that the lines are inadvertently being filled by the test procedure and that no positive means are presently in use to assure filling. One problem is that there is no high point vent in the pipe, downstream of the suction line isolation valve, that can be used for venting and to assure filling. The licensee expressed confidence that current test procedures result in suction line filling and that the Residual Heat Removal Pumps and Containment Spray Pumps are ready to take suction from the recirculation sump in the event this is required.

Inadvertent filling of these lines is unacceptable and the inspector considers this an unresolved item (315/84-13-11(DRS); 316/84-15-11(DRS)) pending further evaluation by the licensee and review by the inspector. The inspector informed the licensee that changes in the inservice testing schedule, test technique, or the manner in which recirculation flow is initiated could affect the availability of the containment recirculation sump until positive means are initiated to assure filling of the sump suction lines.

No items of noncompliance or deviations were identified.

11. Pump Testing Program Details

The pump test program was reviewed and discussed with the licensee. In addition to program comments in Paragraph 3, the inspector noted the following:

- a. The licensee is monitoring vibration on one pump bearing, as required by IWP-4510, and additional bearing where failures have been previously experienced. The inspector suggested that the licensee consider monitoring all bearings including those on the motor. The inspector has no further questions on this item.

- b. Bearing temperatures are taken yearly in January. No data is taken so that the winter conditions can be extrapolated to determine bearing cooling adequacy under limiting temperature conditions. Also, without the data and appropriate extrapolations, degradation of bearing cooling circuits cannot be detected. This is considered an open item (315/84-13-12(DRS); 316/84-15-12(DRS)) pending further evaluation by the licensee and review by the inspector.
- c. The licensee allows flow to vary between 0.94 and 1.02 times "reference" without correction of the differential pressure reading when pump differential pressure is the variable monitored to evaluate pump degradation. The inspector interprets the Code as requiring that one of the two readings be fixed, corrected for, or the effects on the evaluation determined negligible, before evaluating the second variable for pump degradation. This is considered an open item (315/84-13-13(DRS); 316/84-15-13(DRS)) pending further evaluation by the licensee and review by the inspector.

No items of noncompliance or deviations were identified.

12. Open Items

Open items are matters which have been discussed with the licensee, which will be reviewed further by the inspector, and which involve some action on the part of the NRC or licensee or both. Open items disclosed during the inspection are discussed in Paragraphs 4.e, 4.f, 8.c.(1), 8.c.(2), 11.b and 11.c.

13. Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items, items of noncompliance, or deviations. Unresolved items disclosed during the inspection are discussed in Paragraphs 4.d, 7, 9 and 10.

14. Exit Interview

The inspectors met with licensee representatives (denoted in Paragraph 1) on August 10, 1984, and September 19, 1984, to discuss the scope and findings of the inspection. The licensee acknowledged the statements made by the inspectors with respect to items discussed in the report.